THEME 1: POPULATION AND SETTLEMENT

Chapter 1

Population dynamics

Learning summary

By the end of this chapter, you should be able to:

- describe and give reasons for the rapid increase in the world's population
- show an understanding of over-population and under-population, including the causes and consequences for both
- understand the main causes of a change in population size, including how birth rate, death rate and migration can cause a country's population to increase or decline
- give reasons for contrasting rates of natural population change, including the impacts of social, economic and other factors (including government policies, HIV/AIDS) on birth and death rates
- describe and evaluate population policies
- demonstrate knowledge of case studies, including: a country which is over-populated, a country which is under-populated, a country with a high rate of natural population growth, and a country with a low rate of population growth (or population decline).

Many terms are used to differentiate countries with different levels of economic development. Countries with high levels of economic development are termed MEDCs (More Economically Developed Countries) or HICs (High Income Countries). Countries with low levels of economic development are termed LEDCs (Less Economically Developed Countries) or LICs (Low Income Countries). Between these two groups are the MICs (Middle Income Countries). Many of these MICs are also NICs (Newly Industrialised Countries). These terms will be used throughout this section.

1.1 Some important concepts

These terms are used to measure the level of economic development of a country based on its GNI per capita (Gross National Income per person). The value is thought to be a better measure of how wealthy a country is than the GDP per capita (Gross Domestic Product). However, the levels do change over time. The HIC threshold was originally set in 1989 at $6000. By 2017, a country was classified by the World Bank as an HIC if its GNI per capita was above $12 476, an MIC if its GNI per capita was between $1026 and $12 475, and an LIC if its GNI per capita was $1025 or less. Figure 1.1 shows the global distribution of HICs in 2015.

Figure 1.2 illustrates how the birth rate varies around the world and highlights the differences between HICs, MICs and LICs. Globally, the birth rate has been in decline for a long period of time. In 1950, it was 37.2 live births for every 1000 people; in 1970, it was 30.8; in 1990, it was 24.7; and in 2016, it was 18.6 live births for every 1000 people.

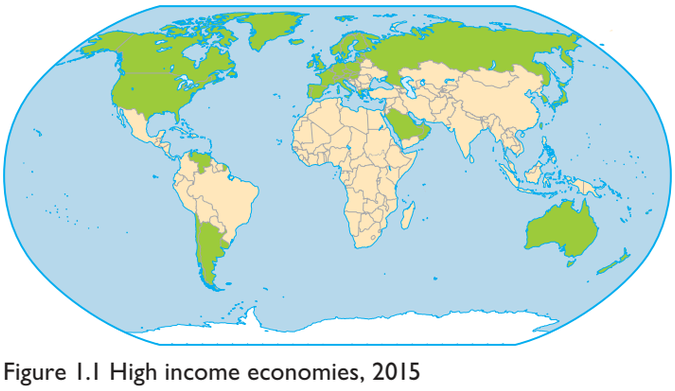

Figure 1.1 High income economies, 2015

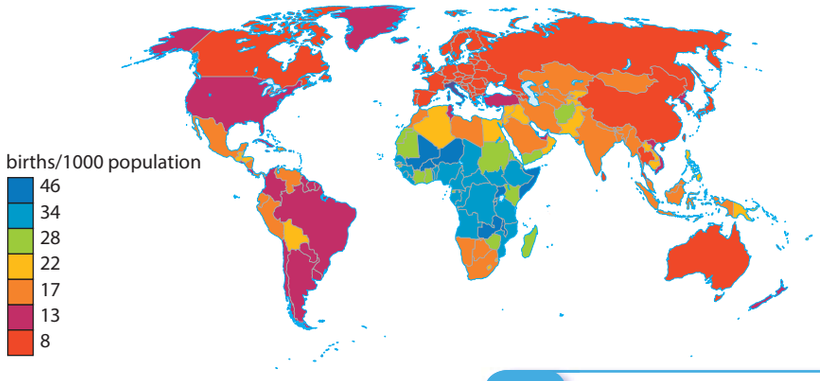

Figure 1.2 Countries by birth rate, 2014

TERMS

GNI per capita: the total value of all the goods and services a country produces (GDP) plus the net income it receives from other countries, divided by the population of the country

GDP per capita: the total value of all the goods and services produced in a country in one year by all the people living in that country

birth rate: the average number of live births for every 1000 people in a country per year

1.2 World population increase

Even though the birth rate is decreasing, people are living longer, so the world's population in 2017 was estimated to be 7.56 billion and this figure will continue to grow. According to the most recent United Nations (UN) estimates, the world's population is expected to reach 8 billion people in 2024 (Figure 1.3).

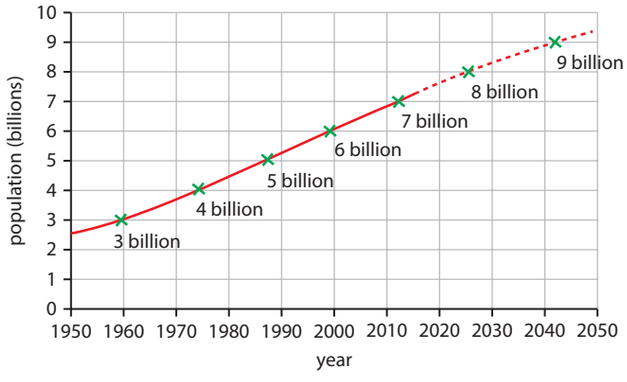

Figure 1.3 World population, 1950–2050 (projected)

TIP

You may be asked to describe the information and trends that you see on graphs. Most of the graphs and diagrams used will be produced specifically for the question and contain information that you should use in your answer. If you are asked to describe the trends on a graph:

- describe whether the values have gone up, down, or stayed the same over the time period
- describe if the change has been fast or slow
- give the actual values and name the time period
- state whether any increase or decrease has been steady or whether it has changed in certain periods
- if there are anomalies to the trend, name the years in which it changed and the values (use a ruler to ensure you are accurate in finding the exact year and recording the exact value on the axes).

However, the rate of growth of the world's population is slowing down – the rate of growth today has almost halved (Figure 1.4) since reaching a peak growth rate of 2.2% per year in 1963.

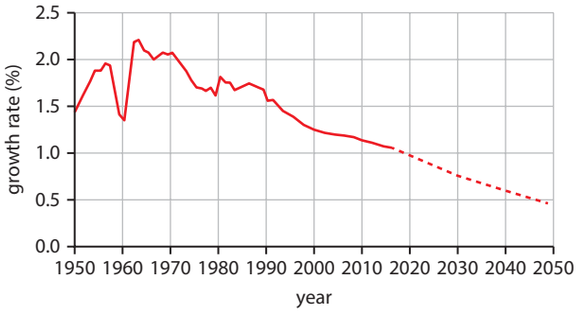

Figure 1.4 World population growth rate, 1950–2050 (projected)

FACT

Figure 1.4 shows that changes in population growth have not always been uniform. A dip in the growth rate between 1959 and 1960, for example, was due to the 'Great Leap Forward' in China. During that time, natural disasters and decreased agricultural output following massive social reorganisation caused China's **death rate** to rise sharply and its **fertility rate** to fall by almost half.

- World births have levelled off at about 134 million per year since the mid-1990s, and are expected to remain constant. However, deaths are only around 56 million per year, and are expected to increase to 90 million by the year 2050.
- Since births outnumber deaths, the world's population is expected to reach nearly 9 billion by the year 2042.
- Population projections are not always accurate and can vary greatly. A 2014 estimate forecast a population of between 9.3 and 12.6 billion in 2100, and continued growth thereafter. Some researchers have questioned the **sustainability** of further world population growth, highlighting the growing pressures on the natural environment, global food supplies and energy resources.
- Population growth varies considerably between the continents. Asia has the largest population, with its 4.3 billion people accounting for about 60% of the world population. The world's two most populated countries, China and India, together constitute about 37% of the world's population.
- During the 20th century, the world's population grew more than ever before, rising from about 1.6 billion in 1900 to over 6 billion in 2000.

Reasons for rapid population growth

World population growth, 1750–1900

Up to 1750, both the death rate and the birth rate were high. This meant that there was very little growth in the total population. From about 1750, birth rates remained high (around 35 live births per 1000 people), but the death rate dropped rapidly to about 20 deaths per 1000 people. The fall in the death rate was due to:

- improvements in farming techniques, which produced higher crop yields, and improvements in transport; this meant that food supplies increased, helping to reduce starvation and malnutrition

TERMS

death rate (mortality rate): the average number of deaths for every 1000 people in a country per year

fertility rate: the number of live births per 1000 women of the childbearing age group (aged 15–49)

sustainability: the ability of an area or country to continue to thrive indefinitely by maintaining both its economic viability and its natural environment, at the same time meeting the needs of both its present and future generations by limiting the depletion of its resources

life expectancy: the average age to which a person is expected to live, based on the year they were born and their current age

- significant improvements in public healthcare, including medical breakthroughs (e.g. the development of vaccinations), improved food handling and general personal hygiene, which came from a growing scientific knowledge of the causes of disease and improved education
- improved water supply and sewage disposal, so there were fewer deaths from diarrhoea.

This resulted in increased **life expectancy**. As there was no corresponding fall in birth rates, and more people were living for longer, many countries experienced a large increase in population. This caused the world's population to increase at a much faster rate than previously (a 'population explosion') as the gap between deaths and births grew wider.

TERMS

urbanisation: the increase in the number of people living in towns and cities, causing urban areas to grow

subsistence agriculture: growing enough to feed your family, with little or no extra food to sell for cash

over-population: a country or region that does not have enough resources to keep all of its people at a reasonable standard of living

under-population: when there are not enough people living in a region or country to make full use of the resources at a given level of technology

Factors that contributed to a reduced birth rate	Factors that contributed to a reduced death rate
• access to contraception – family size could be planned • increases in wages – families were better off and no longer required their children to generate income • increased urbanisation – children were not needed as much for work as they were in rural farming families • an improvement in the status and education of women, resulting in women choosing to stay in full-time education for longer or deciding to work and to follow careers rather than have children at an early age or not have children at all.	• improvements in healthcare and nutrition • a reduction in subsistence agriculture • increases in wages.

Table 1.1 Reasons for a reduction in birth rate and death rate

World population growth in the 20th century

In the 20th century, population growth accelerated. This was because as the birth rate fell (to about 20 live births per 1000 people), the death rate also continued to fall (to about 15 deaths per 1000). Life expectancy continued to increase, resulting in a rapid increase in population. The reasons behind these changes are shown in Table 1.1.

FACT

Even with all these improvements, the World Health Organization (WHO) estimated that 303 000 women died from complications related to pregnancy or childbirth in 2015. In addition, for every woman who dies in childbirth, dozens more suffer injury, infection or disease.

1.3 Over-population and under-population

Over-population and under-population are relative terms; they express population in relation to the resources in a country or region at a given level of technology. So, a resource-rich HIC with sophisticated technology could be under-populated, but an LIC with few natural resources (having, for example, infertile soils, a challenging climate for crop growing, or no natural resources such as coal or minerals) and traditional technology may be over-populated. Rural areas in LICs may become under-populated where agricultural output has fallen and depopulation has occurred; land has been abandoned due to rural–urban migration (see Chapter 2), or suffered the impact of a natural catastrophe such as drought and floods; because there is a war; or felt the impact of communicable diseases, such as HIV/AIDs. Most areas considered to be under-populated today are large in area and are resource rich, such as Australia, Canada, Kazakhstan and Mongolia.

The two main causes of over-population are an increase in the birth rate accompanied by a decrease in the death rate. The consequences of over-population include:

- **Water** – globally, more than 1 billion people do not have access to clean drinking water. In 2015, 2.7 billion found water scarce for at least one month of the year. Agriculture consumes more water than any other source and aquifers are being depleted faster than they can be replenished. At the current rate of consumption, two-thirds of the global population may face water shortages by 2025.
- **Food** – there is a possibility that the demand for food will overtake food production by 2050 if the current rate of output continues. In 2015, around 795 million people did not have enough food to lead a healthy and active life.
- **Environment** – most current research indicates that climate change, due to human emissions is a major consequence of over-population. Global warming may result in higher commodity prices, the collapse of fisheries, loss of species' habitats and more extreme climate events.

Self-test questions 1.1

1 Explain why birth and death rates fell in the 20th century.

2 What is the relationship between population growth and resources?

1.4 The main causes of a change in population size

Changes to the population size and structure are caused by social, economic and other factors, such as political policies and decisions.

The **social factors** include healthcare, lifestyle, education and migration. For example, in the UK, the National Health Service, set up in 1948, offered free healthcare to the UK population and this has increased life expectancy. Changes in lifestyle have also increased life expectancy through education and by advertising the risks associated with alcohol, cigarettes, certain types of food and the advantages of regular exercise.

The **economic factors** include the availability of employment and wage levels which can trigger migration to or from regions and countries. For example, the UK has seen an influx of migrants from east European countries such as Poland, Hungary and Lithuania since 2004 and more recently from Romania and Bulgaria.

The **political factors** include government population policies, as in China, and civil war, such as in South Sudan. A civil war can contribute to lower population densities in a country or region as people become refugees and leave an area.

Changes to the birth and death rates and migration all have an impact on whether the population of a country is growing or declining. Changes in birth and death rates can bring about a natural increase or decrease in population, while migration can impose its own changes on a country's population (see Chapter 2).

In the 21st century, population growth has begun to level off with low birth and death rates in many countries, particularly in the HICs and MICs. In some countries, mainly HICs, birth rates have dropped to well below replacement level, as has happened in countries like Germany, Italy and Japan, leading to a shrinking population. By 2050, the UN projects that three out of every four LICs will be experiencing below-replacement level fertility. Asia's more developed countries are becoming concerned about declining birth rates.

TERMS

natural increase: the birth rate exceeds the death rate and the population grows

replacement level: the average number of children born per woman at which a population exactly replaces itself from one generation to the next

FACT

Replacement level fertility varies globally from about 2.1 children born per woman in HICs to 3.3 in LICs.

In wealthy HICs, women are now having their first baby four years later than they did in 1970. In the UK in 2016, women over 40 years of age were having more babies than women under 20. There were 15.2 births per 1000 women aged over 40, compared with just 14.5 per 1000 women under 20. The reasons for this include:

- advances in fertility treatment
- rising costs of child rearing
- higher levels of women in education leads to more women in the workplace, which can result in fewer births.

Women in the UK aged between 30 and 34 had the highest fertility of any age group – with 111 births per 1000 women.

1.5 Natural population change

Some LIC and MIC countries have both a high birth rate and a high rate of natural population growth. Examples are Kenya, Ethiopia, Nigeria and the Philippines. This can have several social and economic impacts.

The important **social factors** and impacts here include:

- The health service and hospitals will need to be able to accommodate the needs of a young population. High birth rates will require more specialist midwife nurses and clinics to observe, immunise and vaccinate infants.
- More primary schools will be needed.

The **economic** factors include:

- Food supply will need to increase, either by increasing a country's own food production or by importing food.
- At some point, these children will need jobs and if the economy has not expanded this may lead to higher levels of unemployment.
- However, this population growth will also provide an increased pool of labour which can stimulate economic activity, industrial production and economic growth.

Other factors include the political decision to increase taxation to pay for the expansion of social care, health-care and education.

In HICs that have gone through the economic transition from manufacturing-based industries into service and information-based industries – a process called deindustrialisation – fertility rates are well below their replacement level, as Table 1.2 illustrates:

	1917	1967	1992	2017	2040	2099
Australia	3.1	2.8	1.9	1.9	1.9	1.9
China	5.5	5.3	2.2	1.7	1.7	1.9
France	1.3	2.7	1.7	2	2	2
Germany	2.5	2.4	1.3	1.5	1.6	1.8
Japan	5	2	1.5	1.5	1.7	1.8
Sweden	2.9	2.3	2.1	1.9	2	2
UK	2.1	2.6	1.8	1.9	1.9	1.9
USA	3.3	2.6	2	2	2	2

Table 1.2 Total fertility rates (with projections)

This has led to a population decline and can be seen in many countries in Western Europe (UK, Germany, Italy and Spain) and Japan. The population of these countries is falling due to fertility decline, emigration and, particularly in Russia, increased male mortality. The death rate can also increase due to 'diseases of wealth', such as obesity or diabetes, in addition to ageing.

The impact of HIV/AIDS

For most of the world, death rates are falling, but there are several countries where it is rising. HIV/AIDS is one of the main reasons for this. It is the major cause of deaths in the continent of Africa. In the 12 countries worst affected in Africa, 1 in 10 people between the ages of 15 and 49 are HIV positive. In some parts of southern Africa, such as Botswana, 40% of adults are infected. About 70% of the world's HIV cases live in sub-Saharan Africa.

The AIDS epidemic is concentrated in seven countries in southern Africa, including Botswana (39% of the population) and South Africa (22%). In these seven countries, the population dropped by 26 million (19%) by 2015 and may drop by 77 million (36%) by 2050. For countries affected by HIV/AIDS, there are six main impacts:

- **Labour supply and the economy** – as more people become infected with HIV/AIDS in the economically active 15–49 age group, there will be fewer people available to work and the development of the country and its economy may actually go into reverse. In agriculture, this means less food can be grown and harvested.
- **The family** – the death of parents in many families means that the grandparents and the children are left to look after the family. Often there are no grandparents, and there are now thousands of orphaned children in southern Africa.
- **Education** – many people are not aware of how they can avoid catching HIV, because LIC governments do not have the money to spend on education about HIV/AIDS.
- **Poverty** – the lack of money in LICs means that most people are unable to afford the cost of the drugs that are now available to treat the disease.
- **Infant and child mortality** – HIV can be passed on to children by their mothers, which means that the number of infant and child deaths increases.
- Dependency ratio – the people who have AIDS are normally in the economically active age range, who would normally look after and support the economically inactive group.

TERMS

deindustrialisation: a process of social and economic change caused by the removal or reduction of industrial capacity or activity in a country or region, especially heavy or manufacturing industry

dependency ratio: the ratio between the economically active and the economically inactive population (age spans for these terms vary between countries)

1.6 Population policies

Several countries have introduced population policies to exert some form of control on their population. Population control normally involves the practice of either limiting population increase, usually by reducing the birth rate, or increasing population by encouraging higher birth rates and immigration. France, for example, gives parents money in the form of child benefits and it also gives the parents maternity and paternity leave from work after the birth of a child.

The practice of population control has sometimes been voluntary – as a response to poverty, environmental concerns, or out of religious ideology – but in other times and places, it has been the law of the country. It is generally done to improve the **quality of life** for a society or as a solution to over-population. Population control may involve one or more of the following practices:

- increasing the access to contraception
- abstinence
- educating women about family planning
- improving healthcare so that infant and child mortality rates drop, which reduces the need to have more children
- encouraging emigration to other areas in a country
- decreasing the numbers arriving through immigration
- advertising campaigns putting forward the advantages of a smaller or larger family
- offering bonuses to those people who have smaller or larger families.

The methods chosen can be strongly influenced by the religious and cultural beliefs of the community's members. A specific practice may be allowed or mandated by law in one country while prohibited or severely restricted in another. This can generate much controversy between and within different societies.

Population control by governments often involves either **anti-** or **pro-natalist policies**.

Anti-natalist policies may be put into place when countries believe that their population is rising too quickly, leading to possible over-population, when their resources may not be able to sustain their population – they may therefore exceed their **carrying capacity**. Countries with these policies may look at:

- providing free contraception
- laws to limit family size
- encouraging the education of women.

TERMS

quality of life: the general well-being of individuals and societies, covering the negative and positive features of life, including a person's family, income and access to services

anti-natalist policies: these aim to lower birth rates and encourage lower fertility rates

pro-natalist policies: these aim to encourage higher fertility rates and so increase birth rates

carrying capacity: the amount of resources in a country necessary to support the country's population

Policies favouring natural population growth are often put into operation in countries with a low rate of population growth (or population decline), where there is a stagnant or falling economically active or working population or when there is an ageing population. Such policies look at ways that encourage women to have more babies.

Self-test questions 1.2

1 What are the reasons for contrasting rates of natural population change?

2 Describe the ways in which a country may attempt to alter its population growth.

TIP

Note that question 2 does not ask how to **limit** population growth, but how to **alter** population growth. This means that the ways may include either pro- or anti-natal policies or both. In your answer, you should discuss both.

Case studies

Over-population – Kuwait

Causes

In 1938, huge oil reserves (the sixth largest in the world) were discovered in Kuwait. Kuwait experienced a period of enormous economic growth and prosperity driven by the oil revenues from this discovery. The revenue transformed the country and it went from having a very low population density (see Chapter 4) to a country with a high population density (see Table 1.3).

Year	Population
1950	152 000
1960	262 000
1970	750 000
1980	1 384 000
1990	2 059 000
2000	1 929 000
2010	3 059 000
2016	4 348 000

Table 1.3 The growth of Kuwait's population since 1950

Oil accounts for nearly half of Kuwait's GDP and 94% of its export revenues and government income. In 2017, according to the World Bank, Kuwait had the fifth highest per capita income in the world, $73 017 per person. The growth in Kuwait's economy would not have been possible without the use of migrant labour. This accounted for 69% of Kuwait's total population in 2016. In 2016, Kuwait's population density was 236 people per km^2. However, without its oil revenues, this figure would be nearer 10 per km^2.

Kuwait has hot summers, very low precipitation (110 mm per year) and high evaporation rates (Figure 1.5).

TERMS

migrant labour: people who move to a country to work

Consequences

There are no permanent rivers and Kuwait's sources of groundwater would not be sufficient to sustain a population above its 1960 population of 262 000. While the country is one of the most arid on the planet, its water consumption levels per capita are among the highest in the world. It has a daily use of around 550 litres per capita in 2015, more than double the average international rate. With extremely limited natural resources, the government has relied on desalination (the removal of salts and minerals) to provide industry and households with fresh water, at a cost of over $2 billion annually. Because of its desalination of seawater and air conditioning operations, Kuwait consumes double to quadruple the electricity of other HIC countries (four times that of the UK).

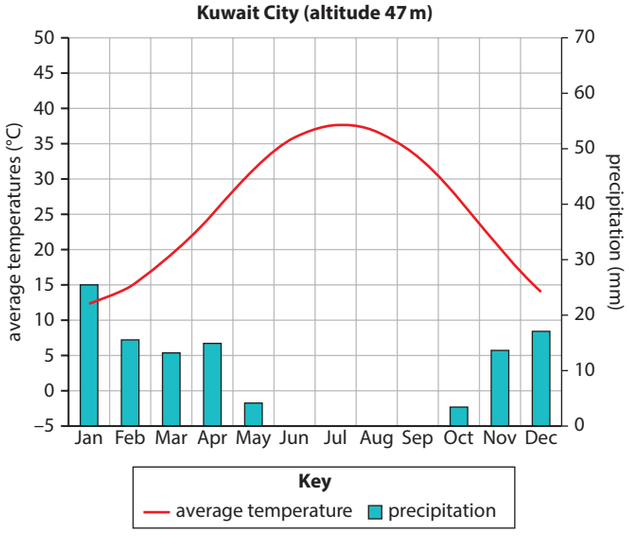

Figure 1.5 Average temperatures and precipitation for Kuwait City, Kuwait

A case study of an under-populated country – Mongolia – can be found in Chapter 4

A country with a high rate of population growth – China

One of the most famous examples of government population control is China's **One Child Policy**, introduced in 1979, in which having more than one child was made extremely difficult for a family. China's 'One Child' policy caused a significant slowing of China's population growth, which had been very high before the policy was introduced. The average number of children per woman in China dropped from 6 to 2.5 and, between 1950 and 2005, the birth rate dropped from 44 per 1000 to 14 per 1000 – a figure comparable to many HICs. It has been estimated that at least 300–400 million births were prevented, easing the pressure on China's resources. The policy's impact has now led to China abandoning the policy from January 2016, when the Chinese government decided to allow all couples to have two children as a 'response to an ageing population'. There were concerns about the Chinese economy potentially not having a labour force large enough to allow continued economic growth.

'One Child' measures introduced by the government included:

- couples were allowed only one child
- men could not get married until they were 22 and women 20
- couples had to apply to the authorities to get married and again when they wanted a baby
- couples were rewarded for having only one child by being given a wage bonus (an extra 10%), free education, priority housing, family benefits
- priority in education, health facilities and employment
- those who did not conform lost these benefits and were given large fines
- the government advertised the benefits of small families such as having a greater amount of disposable income available.

The Chinese government introduced the policy in 1979 to help solve the social and environmental problems China was facing at that time. This included the problem of possibly not being able to feed a fast-growing population, which could have left millions facing starvation and malnutrition. According to Chinese government officials, the policy helped prevent 400 million births. In 1999, the Chinese government started relaxing the policy as the birth rate had fallen from 31 to 19 since 1979. They allowed families in rural areas to have two children.

The policy is controversial both within and outside China because of the issues it raises, the manner in which the policy has been implemented and concerns about the negative economic and social consequences in China. For example, boys are more valued than girls, which has led to female babies being abandoned, and in the future China will face the problems of an ageing population.

The future of the policy in China

Demographers in and outside China have long warned that its low fertility rate – between 1.2 and 1.5 children per woman – was driving the country towards a demographic crisis. They argued that the human toll has been immense and has caused a dramatic gender imbalance, with the result that between 20 and 30 million men may never find female partners. Also, with China's 1.39 billion-strong population ageing rapidly, and with its labour force shrinking, by 2050 China will have about 440 million people over the age of 60. The working-age population – those between 15 and 59 – fell by 3.71 million in 2015, a trend that is expected to continue.

Since 2013, there has been a gradual relaxation of China's family planning laws, which already allowed minority ethnic families and rural couples whose firstborn was a girl to have more than one child, but this was further relaxed in 2016.